# Attachment C

# Community Level Assessment of Public Health Benefits of Draft Scoping Plan: Wilmington Example

## Summary

For this assessment, ARB evaluated criteria pollutant emission reductions in the Wilmington study area assuming that the source-specific quantified greenhouse gas measures are implemented. It was further assumed that the non-source specific program elements such as the proposed cap-and-trade program result in a 10 percent reduction in fuel combustion by affected sources within the study area. For example, it is estimated that industrial sources would achieve greenhouse gas emission reductions through efficiency measures that reduce on site fuel use by 10 percent either in response to a cap-and-trade program, or due to the results of the facility energy efficiency audits. While it is likely that the actual onsite reductions will differ across individual facilities from the assumed uniform 10 percent reduction[1], the analysis identifies how reductions at these facilities affect the overall level of co-benefits.

The estimated NOx co-benefit of about 1.7 tons per day is small relative to the projected reductions of 24 tons per day that will occur as a result of the SIP and other measures. For example, an 8 ton per day NOx reduction is expected from cleaner port trucks. In comparison, the potential NOx benefit from a 10 percent efficiency improvement in major goods movement categories is estimated at about 1.5 tons per day. The estimated PM2.5 co-benefits, on the order of 0.12 tons per day, are also small relative to the projected reductions of 2.3 tons per day that will occur as a result of the SIP and other measures. Approximately 30 percent (0.04 ton per day) of the PM 2.5 co-benefit reduction is associated with assumed energy efficiency measures at the four large refineries in the study area, while another 30 percent would occur due to a 10 percent efficiency improvement by goods movement sources.

The co-benefit emission reductions in the study area would produce health benefits for the population in the study area (approximately 300,000 area residents) as well as regional benefits among a much larger population. Health benefits due to reductions in NOx are mostly at the regional levels, since NOx emissions have usually travelled some distance before they are transformed into PM via atmospheric reactions. Point source combustion PM emissions persist in the atmosphere and increase exposures both in the area where they are emitted and broadly throughout the region. Based on previous modeling studies of the impact of port and rail yard PM emissions in the South Coast Air Basin conducted by the ARB, PM exposures will be reduced far beyond the study area, and a majority of the health benefits are expected to occur in areas outside of the Wilmington community. Using the previously described methodology that correlates emission reductions in the air basin with expected health benefits[2] there would be approximately 11 avoided premature deaths. There is considerable uncertainty inherent in the health impact estimates, particularly for a very localized area such as this. However, the impact estimates are provided here as a way to compare the relative contribution of Draft Scoping Plan co-benefits to the improvements in public health expected from ARB's ongoing pollution control program.

## Overview

Air quality throughout California continues to improve, even with population and economic growth, due to extensive statewide programs that address the smog-forming criteria pollutants and

[1] The reductions at any one facility could be much greater or lesser than 10 percent For example very small or no reductions might occur because available cost-effective industrial emission reductions have already been implemented at a particular site.

[2] See Attachment D

toxic air contaminants. Overall emissions are declining in all communities, although the rate may vary depending upon the nature of local sources. Mobile sources are the dominant source of pollution exposure in communities statewide. Criteria pollutant emission reductions of hundreds of tons per day are estimated statewide by the 2020 timeframe from a combination of longstanding requirements and new measures in ARB adopted plans such as:

- Diesel Risk Reduction Plan (adopted September 2000)
- Goods Movement Emission Reduction Plan (adopted April 2006)
- State Implementation Plan (SIP) (adopted September 2007)

In addition, there will be incremental additional criteria pollutants reductions as a co-benefit of new actions under the AB 32 Draft Scoping Plan for greenhouse gases, primarily due to measures that reduce fuel combustion. This analysis provides preliminary estimates of emission changes for the example community of Wilmington, between 2005 and 2020, due to current programs and the potential incremental co-benefits of measures suggested in the Draft Scoping Plan. The magnitude of criteria pollutant co-benefits for a single community will generally be quite small (less than two tons per day of emission reductions in this example), compared to the benefits of all the existing public health programs to reduce air pollution.

Table 1 summarizes the emission reductions estimated for NOx and PM2.5. Current emissions in the Wilmington community and projected emission levels in 2020 were derived from ARB's ozone modeling inventory. The combined impact of existing programs and new measures in the 2007 SIP is a projected 40-45 percent reduction in 2020 NOx and PM2.5 emissions levels, taking into account projected growth. Draft Scoping Plan measures are projected to reduce Wilmington area emissions by an additional one to two percent. The methods used to estimate the emissions impact, and the resulting public health benefits, are discussed in this Attachment.

**Table 1: Summary of Estimated Emission Reductions – Wilmington Study Area (tons per day)**

| | **NOx** | **PM2.5** |
|---|---|---|
| **Current Emissions** | 52.2 | 5.6 |
| **2020 Emission Reductions** | | |
| Reductions from existing programs and 2007 SIP | 23.7 | 2.3 |
| Reductions from Preliminary Recommendation in Draft Scoping Plan | 1.7 * | 0.12 |
| **2020 Emissions** | 28.0 * | 3.2 |

* See text: Due to RECLAIM for NOx, we have not counted stationary source NOx reductions here.

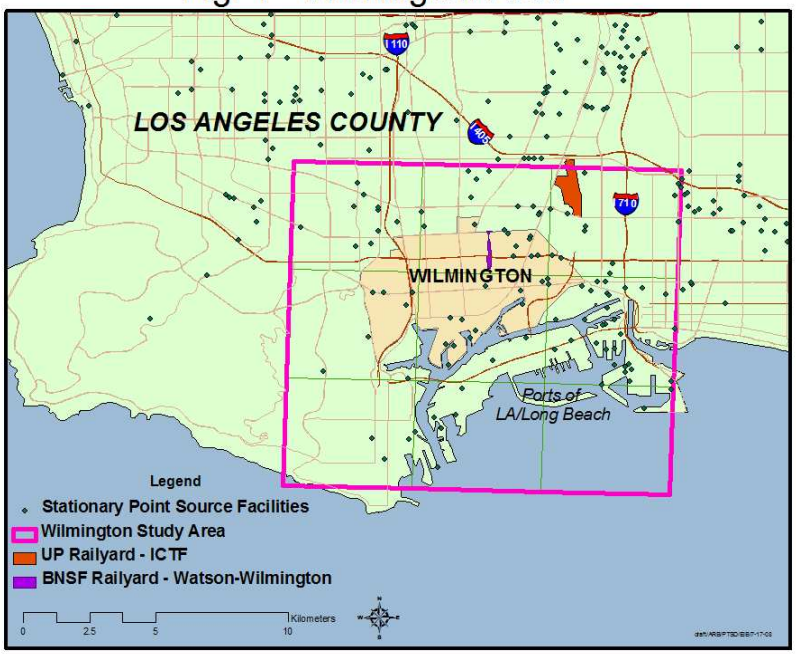
**Methods**

To illustrate the potential co-benefits of the draft scoping plan to local communities, ARB evaluated projected NOx and PM2.5 emission reductions by 2020 for the community of Wilmington, in the Los Angeles area. Current emissions were represented by the 2005 SIP modeling inventory. To place the reductions in context, the analysis considers two cases:

2020 reductions due to existing programs and 2007 SIP measures, and 2020 reductions due to the incremental co-benefits from the Draft Scoping Plan. The 2020 emission projections take into account growth, as well as the combined benefits of existing programs and new SIP measures as they apply to emission sources in the Wilmington community

The Wilmington area in southern Los Angeles County includes a diverse mix of sources: the ports of Los Angeles and Long Beach, major transportation corridors, railyards, refineries, and other industrial/commercial operations. The best available data to characterize base and future year emissions for the full array of source types in this region was the gridded modeling inventory developed by ARB staff for southern California ozone modeling. The modeling inventory includes all mobile, stationary, and areawide source types – all on a spatial grid – for the 2005 base year and for projected 2020 levels. The modeling inventory already incorporates growth factors to account for economic and population growth affecting each sector, and control factors to account for the emission reductions in 2020 due to current regulatory programs, including all the existing programs and 2007 SIP measures. The Wilmington study area for this analysis has been represented as a 12 km by 12 km area, centered on the Wilmington ZIP code 90744, and defined as 9 cells excerpted from the southern California modeling grid domain. The Wilmington "9 cell" area used in this analysis has a population of approximately 300,000 and is shown in Figure 1.

Fig. 1 Wilmington Area




For the Wilmington grid study area, the staff compared the modeling inventory 2005 base year with projected 2020 levels of NOx and PM2.5 emissions for two cases:

1. <u>2020 reductions due to existing programs and 2007 SIP Measures – "before" the Draft Scoping Plan:</u> This "before" case includes all rules/measures for air pollution control adopted

by December 31, 2006, plus SIP Measures. We collectively refer to this case as the "Existing and SIP Measures" case[3];

2. 2020 reductions due to the additional co-benefits "after" the Draft Scoping Plan: This "after" case represents the incremental additional criteria pollutant reductions due to co-benefits from the recommended measures in the Draft Scoping Plan.

Reductions in the NOx and PM2.5 as a co-benefit of the Draft Scoping Plan are expected mostly as a result of avoided fuel combustion. For example, improved energy efficiency programs in the electricity sector will result in the need for less fossil fuel combustion for power generation, resulting in concurrent reductions in criteria pollutant emissions.

Some criteria pollutant co-benefits are distributed over wide areas (e.g., reduced diesel and gasoline combustion from vehicles). Other GHG reductions (whether through source-specific regulations or the cap-and-trade regulation) will occur at individual stationary sources (such as efficiency improvements at industrial facilities) or will concentrate at specific sites (such as ports). This example quantification of co-benefits of the Draft Scoping Plan at the community level is done for comparative purposes to illustrate the likely scale of potential co-benefits in the context of existing programs.

**NOx and PM2.5 Co-Benefits -- "After" Draft Scoping Plan**

This analysis of co-benefits from the Draft Scoping Plan measures focuses on the major categories that, due to measures that reduce GHG emissions, are likely to reduce NOx and PM2.5 emissions by the 2020 timeframe, and for which data exist to quantify reduction estimates. (Several other measures are discussed qualitatively.) Many of these criteria pollutant co-benefits are expected due to reduced/avoided fossil fuel combustion (e.g., through electrification or energy efficiency). In this analysis, approximate percentage-based or fractional-based reductions were estimated for many categories in order to scale the statewide benefits to the particular sources in the localized Wilmington study area. While it is likely that the actual onsite reductions at industrial sources will differ across individual facilities from the assumed uniform 10 percent reduction[4], the analysis identifies how reductions at these facilities affect the overall level of co-benefits. Given the uncertainties in available information and the type of analysis used, estimated co-benefits could be greater or smaller than estimated here. As individual measures are developed better estimates of co-benefits should be possible.

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[3] The "before" case includes what we collectively refer to here as the "Existing and SIP Measures", representing existing programs that focus on direct control of criteria and toxic air pollutants, and reflecting all adopted rules and measures through December 31, 2006, and SIP measures. The "before" case already includes major goods movement measures (ships, port trucks, cargo handling equipment); diesel risk reduction measures; reformulated gasoline and low-sulfur diesel fuel measures; New Source Review and stationary source permitting; the LEV/ZEV program; life-cycle benefits from the initial Pavley I measures for vehicles; consumer products regulations; railroad MOUs; and many other measures. Collectively, the "Existing and SIP Measures" will provide substantial improvements to air quality by 2020, which are greater than – and independent of – the additional co-benefits in the "after" Draft Scoping Plan case. More information regarding SIP Measure quantification factors can be found in the State Implementation Plan.

[4] The reductions at any one facility could be much greater or lesser than 10 percent For example, very small or no reductions might occur because available cost-effective industrial emission reductions have already been implemented at a particular site.

**Table 2: Emissions in 2020 Reflecting Existing and SIP Measures and "Before" Draft Scoping Plan – Wilmington Study Area (tons per day, selected categories)**

| | NOx | ROG | SOx | PM25 |
|---|---|---|---|---|
| **STATIONARY SOURCES** | | | | |
| Electrical Utilities | 0.83 | 0.04 | 0.01 | 0.02 |
| Oil and Gas Production (Combustion) | 0.06 | 0.11 | 0.00 | 0.00 |
| Petroleum Refining (Combustion) | 3.36 | 0.64 | 2.00 | 0.90 |
| Manufacturing and Industrial | 0.94 | 0.10 | 1.00 | 0.12 |
| Service and Commercial | 0.38 | 0.09 | 0.02 | 0.04 |
| Other Fuel Combustion | 0.73 | 0.02 | 0.50 | 0.04 |
| **AREA SOURCES** | | | | |
| Oil and Gas Production | 0.03 | 0.14 | 0.00 | 0.00 |
| Petroleum Refining | 1.92 | 1.10 | 4.32 | 0.36 |
| Petroleum Marketing | 0.00 | 2.58 | 0.00 | 0.00 |
| Residential Fuel Combustion | 0.15 | 0.02 | 0.01 | 0.02 |
| **MOBILE SOURCES** | | | | |
| On-Road Motor Vehicles | 3.42 | 1.78 | 0.04 | 0.27 |
| Aircraft | 0.02 | 0.02 | 0.00 | 0.00 |
| Trains | 0.82 | 0.06 | 0.00 | 0.02 |
| Ships and Commercial Boats | 12.9 | 1.32 | 1.91 | 0.42 |
| Recreational Boats | 0.06 | 0.34 | 0.00 | 0.03 |
| Off-Road Equipment | 1.54 | 1.05 | 0.00 | 0.04 |
| Fuel Storage and Handling | 0.00 | 0.09 | 0.00 | 0.00 |
| **STUDY AREA TOTAL** | **28.5** | **15.3** | **10.1** | **3.3** |

The basic approaches for estimating the NOx and PM2.5 co-benefits of the Draft Scoping Plan measures are described in the following sections by category.

## I. Electricity Production

### A. Renewables Portfolio Standard

The Draft Scoping Plan reflects the goal of increasing California's Renewables Portfolio Standard (RPS) for the mix of power generation to 33 percent by 2020. The increased RPS will mean displacement of other electricity generation, primarily combustion-related operations, largely natural gas. Using the California Energy Commission's estimate that about 70 percent of electricity is generated in-state, we assume 70 percent of the benefit occur in-state. This measure is expected to result in avoided statewide generation (and associated avoided line losses) of approximately 48,000 GWh, which is ~13 percent relative to the estimated 2020 total state

generation of 370,000 GWh. For simplicity, we assume for Wilmington the overall 13 percent average in displaced electricity generation (primarily natural gas units).[5]

For power production related to the localized Wilmington study area, the modeling inventory shows the 2020 levels for electric production "before" the Draft Scoping Plan measures to be 0.83 tons per day NOx and 0.02 tons per day of PM2.5 (using EIC3 010 for Electric utilities from Table 4, resulting in an estimated Scoping Plan co-benefit of 0.076 tons per day NOx and 0.002 tons per day of PM2.5.

### B. Energy Efficiency and Million Solar Roofs

The Draft Scoping Plan considers further energy efficiency improvements in the electricity sector that will decrease demand for electricity (e.g., building/appliance standards, utility energy efficiency programs), and the Million Solar Roofs program. These measures are expected to result in avoided generation (and associated avoided line losses) of approximately 35,000 GWh and 4,800 GWh, respectively, which is ~11 percent relative to the estimated 2020 total state generation of 370,000 GWh. Applying the reduction to the electric utility category emissions in the localized Wilmington study area corresponds to a co-benefit reduction of 0.058 tons per day of NOx and 0.001 tons per day of PM2.5.

### C. Combined Heat and Power

The Draft Scoping Plan considers a statewide usage of 32,000 GWh of combined heat and power (CHP). CHP systems generate electricity and thermal loads at a facility, such as a school, hospital or manufacturing site, replacing onsite thermal generators (boilers) and grid electricity. This replacement results in a net energy savings between a CHP system and a power plant, because the power plant also generates a thermal load but is unable to use it. Additional benefits include avoided line loss for electricity saved. However, this shift can also change the location of co-pollutants, as CHP systems can generate the same, more, or fewer co-pollutants than the power plant, depending on the system's design and operation. CHP systems also have a wide range of sizes, so their regulatory requirements can vary, and at this time the specific locations where CHP will be deployed are not known. Because of this uncertainty, we have assumed a shift between power plant and CHP that is neutral, and we have not assumed co-benefits in criteria pollutant reductions from CHP.

### D. Limitations of Analysis

Several caveats should be noted regarding the power production calculations for this analysis. It is difficult to scale both the statewide electricity usage and statewide electricity production accurately to this localized Wilmington study area. The electricity usage may be higher in the region than an average across all other areas, due to the heavy industrial and port-related uses in this region. At the same time, the power production operations (power plants, etc.) associated with EIC 010 "Electric Utilities" that are included in the 9-cell modeling inventory may not correspond exactly to the production locations of the electricity that is consumed in Wilmington.

[5] This RPS analysis assumes that if any new facilities are built, they are either located outside the Wilmington study area or they do not result in a net increase in criteria pollutant emissions compared to the prevailing power production sources already in the area. The estimate of reduced combustion-related electricity generation should be sufficiently conservative to ensure we have not overstated the potential co-benefits of the RPS.

Given the uncertainties, the benefits of greener electricity could be greater or smaller for this region.

A further consideration is that most major stationary source facilities (including power plants) in the South Coast Air Basin are included in the district's RECLAIM program for NOx emissions trading. This makes the estimation of Draft Scoping Plan local or even regional co-benefits of NOx reductions from stationary sources in this region more uncertain. Therefore, we have not included any NOx co-benefits estimates from stationary sources.

**II. Residential/Commercial Fuel Combustion**

The Draft Scoping Plan considers energy efficiency improvements and solar water heating in the residential and commercial fuel combustion area. We have assumed that this will result in ~10 percent reduction in energy demand, and that ~90 percent of this would be reduction in natural gas combustion. The modeling inventory categories EIC3 060 "Service and Commercial" and EIC3 610 "Residential Fuel Combustion" (Table 4) in the Wilmington 9-cell area together give an estimate of approximately 0.53 tons per day NOx and 0.06 tons per day PM2.5 in the "before" Draft Scoping Plan case. Applying the reduction fractions, we would estimate a Scoping Plan co-benefit reduction of 0.048 tons per day NOx and 0.0054 tons per day PM2.5 in the localized Wilmington area.

**III. Gasoline Measures – On-Road Motor Vehicles**

The Draft Scoping Plan considers the benefits from full implementation of AB 1493 Pavley Phase I and Phase II for on-road passenger vehicles. (It assumes eventual authority to implement the AB 1493 regulation or use of other measures such as "feebates" if needed to achieve equivalent reductions.) The base case scenario "before" the Draft Scoping Plan measures has already included some adjustment for life-cycle benefits of the initial Pavley Phase I measures, as included in the Existing and SIP Measures. The additional measures and full implementation of all phases of Pavley, which are considered by the Draft Scoping Plan, are estimated to provide an additional 20 percent reduction in gasoline combustion, i.e., beyond what was accounted for in the "before" scenario. Therefore, for this analysis, we have assumed that the Wilmington area will experience this same additional 20 percent reduction in gasoline combustion in the on-road motor vehicle usage and a corresponding 20 percent reduction in emissions.

In the Wilmington 9-cell study area, the emissions from gasoline combustion from on-road passenger vehicles are estimated to be 1.03 tons per day NOx, 0.03 tons per day SOx, and 0.11 tons per day PM2.5.

Applying the 20 percent reduction in gasoline combustion, we estimate a co-benefit reduction of 0.022 tons per day of PM2.5. We have not assumed any NOx reductions, because we allow for the possibility that NOx reductions would be credited toward the Low-Emission Vehicle regulation. However, NOx reductions could occur. Some additional benefits are expected from avoided fuel delivery emissions, but these would be small for this local analysis and have not been quantified.

## IV. Diesel Measures – On-Road Motor Vehicles

The Draft Scoping Plan considers measures that will reduce vehicular diesel combustion emissions, including aerodynamic improvements, heavy-duty engine efficiency, and medium/heavy-duty hybridization. We have assumed ~5 percent reduction in diesel combustion in on-road diesel vehicles from these combined measures. In the Wilmington 9-cell study area, the emissions from diesel combustion from on-road motor vehicles are estimated to be 2.2 tons per day NOx, 0.01 tons per day SOx, and 0.1 tons per day PM2.5.

Applying the 5 percent reduction in diesel combustion, we estimate co-benefit reductions of 0.11 tons per day NOx, and 0.005 tons per day PM2.5.

## V. Goods Movement

Many Goods Movement measures are already accounted for in the Existing and SIP Measures, so their benefits are counted in the "before" scenario. This includes rules for port trucks, cargo handling equipment, commercial harbor craft, ocean-going vessel rules such as shore power, and others, and it includes Vessel Speed Reduction provisions, already in place at the Ports of LA/Long Beach.

Goods Movement efficiency measures that are proposed in the Draft Scoping Plan are additional to the SIP, but have not been developed in enough detail to provide well-defined estimates of co-pollutant benefits. However, the study area contains a very large concentration of goods movement sources, and the potential co-benefit from the proposed measure in the draft scoping plan could be significant. Further discussion of some of the key additional categories is included below.

### A. Systemwide Efficiency Improvements

The Draft Scoping Plan considers diverse systemwide efficiency improvements across the whole goods movement sector. It is difficult at this time to characterize exactly what will be achieved in the localized Wilmington area, but they should be substantial.

### B. Commercial Harbor Craft Education/Outreach for Maintenance and Design Efficiency

The Draft Scoping Plan considers improvements in harbor craft efficiency through various measures, the benefits of which are not yet individually quantified. We have not estimated reductions in the Wilmington area, but because the study area includes the ports and railyard activity, co-benefits in reduced NOx and PM2.5 would be expected.

### C. Anti-Idling Measures for Cargo Handling Equipment

The Draft Scoping Plan considers reductions in idling emissions for cargo handling equipment at ports and railyards through anti-idling measures, the benefits of which are not yet individually quantified. Because the area includes ports and railyard activity, co-benefits in reduced NOx and PM2.5 would be expected.

### D. TRU Electrification at Distribution Centers and Energy Efficiency Guidelines

The Draft Scoping Plan considers measures which would expand on the existing transport refrigeration unit (TRU) ATCM regulations, both with energy efficiency guidelines and limitations on using internal combustion engine power for cold storage at distribution centers and grocery stores. There are cold storage distribution facilities in the Wilmington study area, and there are likely to be NOx and PM2.5 co-benefits for these TRU measures in the area.

### E. Port Trucks

Benefits for the Port Truck rule were already estimated in the "before" case for the Existing and SIP Measures, including a NOx reduction of ~8 tons per day for the South Coast Air Basin, estimated from the Port Truck rule. We are not assuming any additional measures resulting in co-benefit reductions for the "after" Draft Scoping Plan case. However, in the modeling inventory analysis, the benefits due to the Port Truck rule were spatially distributed along with all other heavy-duty trucks using the SCAG heavy-duty truck model. In reality, proportionally more benefits of the ~8 tons per day NOx reduction would be expected to be highly localized near the Wilmington area than are likely to have been captured by the SCAG truck model.

### F. Modeled Co-Benefit Reduction

Although the specific measures to improve efficiency in the goods movement sector are not known, it is reasonable to assume a 10 percent reduction in emissions from ships, trains, and off-road equipment in the Wilmington study area. This would provide 1.5 tons per day of NOx reductions and 0.05 tons per day of direct PM2.5 reductions. We believe this is a conservative estimate, as the proposed measure in the Draft Scoping Plan assumes a 20 percent reduction in greenhouse gas emissions from goods movement sources by 2020.

## VI. Reductions at Industry Facilities

The Draft Scoping Plan identifies measures under consideration for various industrial categories. The modeling inventory for the Wilmington 9-cell area identifies numerous point source facilities in the categories of petroleum refineries, oil and gas production, and others. (Cement and glass manufacturing facilities do not occur in the Wilmington area.) The emissions inventory data also identify the processes that are combustion related, such as boilers over 10 MMBtu/hr.

One further consideration is that most major stationary source facilities (including refineries, oil and gas production facilities, and many other major industrial sources) in the South Coast Air Basin are included in the district's RECLAIM program for NOx emissions trading. This makes the estimation of local or even regional co-benefits of NOx reductions from stationary sources in this region more difficult. Therefore, we have not included any NOx co-benefits estimates from any stationary sources in the final totals. (PM2.5 reduction estimates are not affected by RECLAIM.)

Specific source types are discussed further below. Some of the industrial types are listed as "under evaluation" in the Draft Scoping Plan. For the purposes of this evaluation, it was necessary to make assumptions about potential emission reductions at industrial sources in the Wilmington area. We assumed that industrial sources would achieve greenhouse gas emission reductions through efficiency measures that reduce onsite fuel use by 10 percent, either in

response to a cap-and-trade program or due to the results of the facility energy efficiency audits. While it is likely that the actual onsite reductions will differ across individual facilities from the assumed uniform 10 percent reduction[6], the analysis identifies how reductions at these facilities affect the overall level of co-benefits. Some information is available about the emission reductions potential and possible cost for of reductions at these sources.

### A. Energy Efficiency and Co-Benefits Audits at Large Industrial Sources

The Draft Scoping Plan recommends the use of audits to identify efficiency improvements to produce cost-effective GHG emission reductions at large industrial sources. The measure is also intended to provide additional information to evaluate whether cost-effective greenhouse reduction measures would also provide criteria pollutant and/or air toxics reductions as a co-benefit. Some level of reduction in NOx and PM2.5 from energy efficiency measures at large industrial facilities in the Wilmington area is likely, but it is not possible to quantify reductions at this time.

### B. Refineries – Source Category Under Evaluation

The Draft Scoping Plan includes a measure under evaluation that would target GHG reductions from the refinery sector. However, the measure is not well enough developed to determine what mechanisms would be used to secure these reductions, or how such a measure would change co-pollutant emissions at individual refineries. In general, the analysis suggests that many refineries could implement efficiency measures (such as boiler replacements or efficiency "tune-ups") that could reduce GHG emissions at relatively low cost. Overall, a fuel savings on the order of 10 percent seems feasible. If implemented statewide, this could produce a PM2.5 co-benefit on the order of 0.14 tons per day.

In order to illustrate the possible co-benefits of refinery GHG reductions in Wilmington, ARB assumed uniform reductions of 10 percent at each refinery in the study area. The area's four large refineries account for just under 30 percent of the refining capacity in the state, and the potential benefits of a 10 percent improvement in refinery fuel use efficiency could produce about a 0.04 ton per day reduction in PM2.5. No NOx reductions are estimated because each refinery in the area is under the RECLAIM program, so additional NOx reductions at a refinery are likely to be offset by NOx emissions elsewhere at the facility or in the region.

### C. Oil and Gas Extraction – Source Category Under Evaluation

The Draft Scoping Plan considers a number of measures to improve efficiency for combustion processes at oil and gas production facilities. For this preliminary, localized analysis, we have assumed ~10 percent efficiency improvements applied to combustion-related processes at these facilities in the Wilmington study area. The modeling inventory shows approximately 0.06 tons per day NOx and minor PM2.5 from combustion processes occurring at oil and gas production facilities in the Wilmington 9-cell area. Applying a 10 percent factor would result in co-benefit reductions in emissions of 0.006 tons per day of NOx and a minor amount of PM2.5. As discussed above, we are focusing on the PM2.5 reductions, due to RECLAIM considerations affecting NOx from stationary sources.

[6] The reductions at any one facility could be much greater or lesser than 10 percent For example very small or no reductions might occur because available cost-effective industrial emission reductions have already been implemented at a particular site.

## D. Industrial Boiler Efficiency and Internal Combustion Engine Electrification – Source Categories Under Evaluation

The Draft Scoping Plan considers a number of measures to improve efficiency at facilities with boilers that are >10MMBTU/hr, and to pursue electrification of internal combustion (IC) engines over 50 hp. For this preliminary evaluation, we have assumed ~10 percent efficiency improvements applied to boilers >10MMBTU/hr and IC engines at facilities in the Wilmington study area. The modeling inventory includes ~ 0.42 tons per day NOx, 0.026 tons per day SOx, and 0.093 tons per day PM2.5 from boilers >10MMBTU/hr and IC engines occurring at facilities in the Wilmington 9-cell area (other than power plants, refineries, and oil and gas production). Applying a ~10 percent reduction factor for these boilers and engines results in estimated emission reductions of 0.042 tons per day NOx, 0.003 tons per day SOx, and 0.009 tons per day PM2.5. As discussed above, we are focusing on the PM2.5 reductions due to RECLAIM considerations affecting NOx.

### Summary of Emission Co-Benefits

Table 3 summarizes the estimated co-benefit emission reductions estimated for the Wilmington study area resulting "after" the Draft Scoping Plan recommended measures.

**Table 3: Estimated 2020 Emission Reduction Co-Benefits "After" Draft Scoping Plan for the Wilmington "9-cell" Study Area (tons per day)**

| Category | NOx | PM2.5 | Predominant Fuel |
|---|---|---|---|
| **Electricity** | | | |
| Renewables Portfolio | 0.076 * | 0.002 | Natural gas |
| Efficiency & Million Solar Roofs | 0.058 * | 0.001 | Natural gas |
| Combined Heat and Power | *** | *** | Mixed |
| **Residential/Commercial Fuel** | 0.048 | 0.0054 | Natural gas |
| **On-Road Gasoline** | -- ** | 0.022 | Gasoline |
| **On-Road Diesel** | 0.11 | 0.005 | Diesel |
| **Goods Movement** | 1.5 | 0.05 | Diesel |
| **Industrial** | | | |
| Refineries | * | 0.04 | Mixed |
| Oil and Gas | 0.006 * | minor | Mixed |
| Boilers & IC Engines | 0.042 * | 0.009 | Mixed |
| **Subtotal of calculated reductions** | **1.8** | **0.12** | |
| **TOTAL Non-RECLAIM Reductions *** | **1.7** | **0.12** | |

NOTES TO TABLE 3:

* For stationary sources we focus only on the PM2.5 reductions, due to RECLAIM considerations that affect NOx in the South Coast air basin. See text.

** No NOx reductions are assumed from reduced gasoline combustion under Pavley provisions, however, such reductions could occur. See text.

*** No criteria pollutant co-benefits from this category are assumed to occur in the Wilmington study area since the specific locations and types of changes are not known at this time. See text.

**Health Benefit Estimate**

As an illustration of the benefits of existing programs and the co-benefits of the climate change Draft Scoping Plan, the reduced health impacts associated with these NOx and PM2.5 emission reductions were considered. The health impacts associated with ozone and PM2.5 range from respiratory effects to premature death. This section discusses the potential decrease in adverse health effects that would occur as a result of the co-benefits of the Draft Scoping Plan in Wilmington.

The methodology that ARB uses to quantify premature death and other health impacts from exposure to air pollutants is based on a peer-reviewed methodology developed by the U.S. Environmental Protection Agency (EPA). ARB augmented EPA's methodology by incorporating the results of new epidemiological studies relevant to California's population, including regionally specific studies, as they became available. The methodology was described in ARB's March 2006, *Emission Reduction Plan for Ports and Goods Movement (Goods Movement Plan*). The specific application of ARB's methodology to this co-benefits analysis is discussed in Attachment D.

The co-benefit emission reductions in the study area would produce health benefits for the population in the study area (approximately 300,000 area residents) as well as regional benefits among a much larger population. Health benefits due to reductions in NOx are mostly at the regional levels, since NOx emissions have usually travelled some distance before they are transformed into PM via atmospheric reactions. Point source combustion PM emissions persist in the atmosphere and increase exposures both in the area where they are emitted and broadly throughout the region. Based on previous modeling studies of the impact of port and rail yard PM emissions in the South Coast Air Basin conducted by the ARB, PM exposures will be reduced far beyond the study area, and a majority of the health benefits are expected to occur in areas outside of the Wilmington community.

Using the previously described methodology that correlates emission reductions in the air basin with expected health benefits[7] there would be approximately 11 avoided premature deaths.

There is uncertainty inherent in the estimates above. These estimates provide a way to compare the relative contribution of Draft Scoping Plan co-benefits to the improvements in public health expected from ARB's ongoing pollution control program. As the application of the general methodology for estimating health impacts in small populations and small geographic areas is still under development, the results in this section are presented for comparative purposes only.

[7] See Attachment D